

REMARKS

Claims 1–30 are pending in the present application. Claims 15-26 have been withdrawn from consideration. Claims 3, 7, 11, 12, 27 and 30 were amended.

The specification was amended to correct a typographical error.

Reconsideration of the claims is respectfully requested.

I. Claim Objections

The Examiner has objected to claims 3 and 6 due to informalities in the claims. Specifically, the Examiner has objected to the use of “um”, which should be μm . Applicant believes the Examiner intended to object to claim 7, which contains the reference to wavelength, whereas claim 6 does not. Hence, claims 3 and 7 have been amended to include the proper Greek letter designation and overcome the objection.

II. 35 U.S.C. § 102, anticipation

The Examiner has rejected claims 1, 2, 4, 8-14, and 27-30 under 35 USC §102(b) as being anticipated by Tell et al. (U. S. Patent 5,173,749). This rejection is respectfully traversed.

In rejecting the claims, the Examiner states:

Tell et al, discloses an apparatus and method for remotely detecting a gas molecule present in a sample. The sample can be fluid, such as beer, where the gas concentration in the fluid is measured using this method, but it's not limited to that. The method also can be used in the fermentation process (to determine the concentration of alcohol in the sample). The apparatus comprises:

A tunable diode laser 1 for emitting radiation at the maximum absorption band of the gas molecule under investigation, where the laser diode is tuned to the desired absorption band by changing the temperature of the laser and by controlling the current supplied to the laser diode. The laser current control is done through a first connection into the diode laser and the temperature of the diode is controlled through a second current connection to the diode laser via a Peltier cooler (claim 4). See Figs. 10a and 11a.

- A single mode fiber coupling 2 whereby the emitted laser light is carried into the measurement cell 4 from the laser diode 1. This type of connection diminishes the spatial inhomogeneity of the emitted laser radiation.

The gas molecule detection apparatus further comprises a beam splitter 19 whereby the emitted laser light from the diode laser is split into two optical channels, one channel going to the sample cell 4 where the specific gas molecule is investigated and where the presence of the specific gas molecule is detected by a detector 41, and a second channel which connects to a reference cell 5 where a known reference sample is investigated and wherefrom detector 51 provides absorption reference of the content of the cell 5. (claims 8-11). The content of the reference cell is dependent on the specific measurement to be done, i.e., when measurement is done on beer, it inherently will contain water (claim 12).

Both, the reference and the measurement cells, are capable to reflect the incident radiation numerous times so that the light passes through the cells multiple times before it is detected, thus amplifying the signal. (see Figs. 13a-15) (claims 13-14).

The invention taught by Tell specifically relies on a measurement cell (described above by the Examiner) that contains a controlled test sample. By contrast, the present invention does not require a controlled test sample in a cell. Because the present invention detects alcohol remotely (at a distance), by definition it must be able to detect the alcohol in an uncontrolled environment in the presence of other gases.

Similarly, Tell specifically teaches using a waveguide to physically connect the laser source to the measurement cell in order to avoid open-air paths. Again, because the present invention detects alcohol remotely, it specifically works through open air spaces between the laser source and test sample (i.e. roadside to passing vehicle).

Therefore, Tell does not teach the same limitations of the present invention, and the rejection under 35USC §102 has been overcome.

III. Claim Rejections - 35 U.S.C. § 103

The Examiner has also rejected claims 3, 5, 7 under 35 U.S.C. as being unpatentable over Tell et al. further in view of Azzazy et al. (U.S. Patent 5,349,187) and admitted prior art (page 3 of specification).

In rejecting the claims, the Examiner states:

Tell et al. discloses a tunable laser diode that is capable of being tuned to the absorption band of the gas molecule under investigation, however since his method and device is applicable in many different fields he only exemplarily discloses a set of wavelength bands for a particular gas. He

does not limit his method to that particular band, however. Thus in the case of alcohol molecule detection, using the claimed absorption band would have been obvious to one of ordinary skill in the art since according to the conventional method disclosed by Azzazy et al. alcohol molecules exhibit strong absorption at around $1.5\mu\text{m}$ (see Cols.4,5) and since according to the admitted prior art (page 3) the sharpest absorption occurs at between $1.3924\text{-}1.3935\mu\text{m}$.

Also, applying a current with the claimed pulse of 3.6 ms constitutes an obvious step to one of ordinary skill in the art since the current applied depends on the desired absorption range and since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges constitutes only routine skill in the art. *In re Aller*, 220 F.2d 454, 105 USPQ233, 235 (CCPA 1955).

Selecting the proper bands for detection is not as simple or obvious as the Examiner has asserted. The section of the specification to which the Examiner refers (page 3) does not simply state that the sharpest absorption for alcohol occurs at $1.3924\text{-}1.3935\mu\text{m}$, but rather that the sharpest absorption in the *near infrared range* occurs at $1.3924\text{-}1.3935\mu\text{m}$. The specification goes on to state that the high intensity absorption lines exist in the mid infrared range of $3\text{-}10\mu\text{m}$. Furthermore, Azzazy specifically states that the bands with the strongest absorption for alcohol are 1.5, 2.74, 3.39, 7.2, 8,05, and $9.5\mu\text{m}$. Azzazy specifically uses the absorption lines within the $1.5\text{ or }3.39\mu\text{m}$ bands. (See Col. 5, lines 1-13)

The selection of the near infrared bands of $1.392\mu\text{m}$ for the present invention is actually a deviation from the maximum absorption lines typically used for alcohol detection. This sacrifice of absorption intensity in the present invention is made because the near infrared band of $1.392\mu\text{m}$ is not hazardous for eyes if power does not exceed 1mW, and because glass windows are transparent in this range. Therefore, the selection of the wavelength for the present invention is a compromise based on weighing costs and benefits, and there is nothing *a prior* obvious about the selection. Even the choice of wavelengths taught in Azzazy is based on the practical reason that lasers at those wavelengths do not have stringent cooling requirements and are readily available.

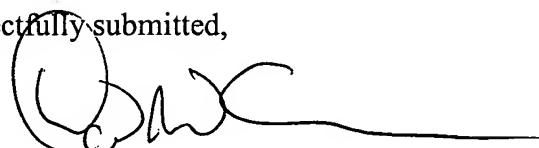
Therefore, the rejection of claims 3, 5, and 7 under 35 USC §103 has been overcome.

Conclusion

The examiner is invited to call the undersigned at the below-listed telephone number if in the opinion of the examiner such a telephone conference would expedite or aid the prosecution and examination of this application.

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Respectfully submitted,

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